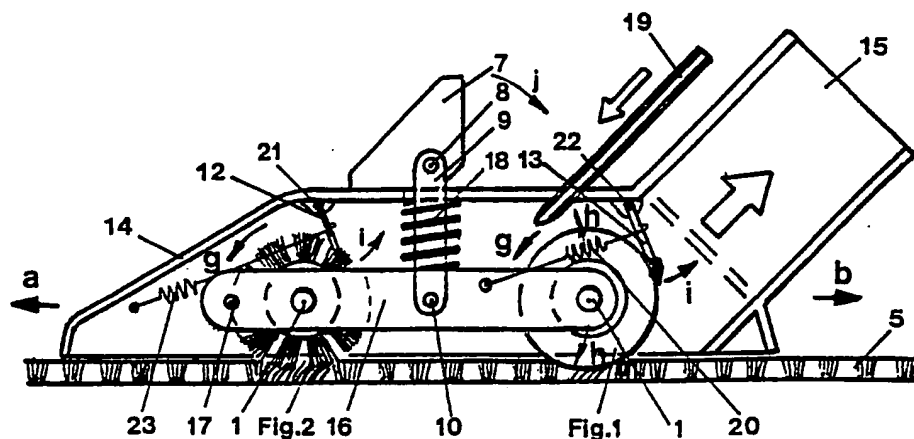




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/DK91/00391 (22) International Filing Date: 11 December 1991 (11.12.91) (30) Priority data: 3015/90 20 December 1990 (20.12.90) DK (71)(72) Applicant and Inventor: SJØGREEN, Jørgen [DK/DK]; Dybesøvej 60, DK-4581 Rørvig (DK). (81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BF (OAPI patent), BG, BJ (OAPI patent), BR, CA, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CI (OAPI patent), CM (OAPI patent), CS, DE, DE (European patent), DK, DK (European patent), ES, ES (European patent), FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), GN (OAPI patent), GR (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC (European patent), MG, ML (OAPI patent), MN, MR (OAPI patent), MW, NL, NL (European patent), NO, PL, RO, SD, SE, SE (European patent), SN (OAPI patent), SU*, TD (OAPI patent), TG (OAPI patent), US.		Published <i>With international search report.          In English translation (filed in Danish).</i>

(54) Title: UNIVERSAL NOZZLE FOR VACUUM CLEANERS



## (57) Abstract

Universal nozzle to be used in connection with general known vacuum cleaners and the like, with or without washing devices, to clean floors with different floorings, including carpets, textiles and the like. The nozzle is provided with one or more cylindrical rollers, (Fig. 1 and Fig. 2), so suspended and so designed, by means of free wheeling bearings, so the rollers freely can revolve around their own axis, when the nozzle (14) is moved in one direction, but where the rollers are blocked, when moved in the opposite direction. Hair, thread and other foreign materials are thereby assembled in an oblong cylindrical cushion, easy to evacuate. The rollers can be provided with outside linings of different kind, for instance as a rubber roller, (Fig. 1), or as a brush roller, (Fig. 2). The rollers can be suspended in an activation device (7) and (10), making it possible to activate one or more of the rollers. The rollers are provided with beams (12) and (13), in order to scrape off hair and foreign materials, which are fastening on these, by which the rollers are self cleaning. The beam (13) is so designed, that it in same time is acting as a throttle valve.

**+ DESIGNATIONS OF "SU"**

Any designation of "SU" has effect in the Russian Federation. It is not yet known whether any such designation has effect in other States of the former Soviet Union.

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## UNIVERSAL NOZZLE FOR VACUUM CLEANERS.

The invention relates to a universal nozzle, designed for use in connection with the hitherto known vacuum cleaners, with or without washing devices, to carpet brushing equipment or other floor cleaning machinery, to clean floors covered with different materials, such as carpets, pre-mixed carpeting and other textiles and to floors covered with solid materials, such as wood, parquet, plastic materials, tiles or other ordinary used floor materials. During the invention, it has been important to design a nozzle, especially useable to remove hair originating from humans, dogs and cats, and thread, lint and the like from floors, carpets and other textiles, with or without the use of washing devices. Furthermore, to enable the user to change the same nozzle rapidly to serve different cleaning jobs. In use, the nozzle should have excellent wearing qualities and be gentle to the floor surface. Furthermore, the nozzle should be self-cleaning to the greatest possible extent. The nozzle should also be usable for the cleaning of other kinds of textiles, furnitures, car seats, cushions etc.

20 The nozzles known until now for vacuum cleaners and carpet brushing equipment and the like are characteristic thereby, they are moved forward and backward along the surface. Even if the nozzle is equipped with different kinds of devices, fitted to that side facing against the floor surface, the forward and backward going movement along the floor surface will not be able to loosen and pick up hair and fibers, to such an extent that they can be removed efficiently by a vacuum cleaner. Some nozzles are provided with backward directed teeth of different materials, gripping the nap of the carpet, to remove hair and fibers, etc. Consequently, the nozzle is hard to move and is causing heavy wear on the surface, and hair and fibers are caught in the teeth, whereupon these have to be cleaned manually. Other types of nozzles are provided with textile pads, but these are by experience worn-out rapidly, for which reason they loose their ability to catch hair, etc. Likewise, hair and lints get stuck in the pad. Other known nozzles are using one or more rails of different profiles and methods of suspension, acting by drawing the sharp edge of the rail along the surface of the floor, which consequently is causing heavy wear of the carpet. The up till now known nozzles are not designed to clean all kinds of flooring, or to clean with water

or detergents. The known designs are not comprising a nozzle, which rapidly can be converted to perform cleaning jobs of different kinds, for which reason the user must be in possession of different types of nozzles. The use of the known mechanical or motordriven rotatory brushes is expensive, and does not solve the problems satisfactorily, as hair and fibers are twisted around the brushes, which are difficult to clean.

From Danish patent No.124919 is known a carpet brushing machine which according to the claims is working in such a way, that a brush, positioned transversely in relation to the moving direction of the machine, mounted in the machine at a point of rotation, vertically over the brush, is moved forward and backward along the floor by means of a driving lever, connected to a transversely positioned cylindrical brush, which is rotating, when the brush is moved forward and backward along the floor surface. The brush is revolving around its own axis with alternating direction of rotation, depending on the alternating direction of movement of the machine, and the transversely positioned brush therefore is moving correspondingly forward and backward along the surface.

Danish patent No. 124919 therefore, is not providing a device, which include the in the aforementioned described qualities.

By the present invention, a construction of a nozzle is provided, which is of the in the introductory part of claim 1 described character, and which has the qualities described in the introduction, included in one and the same nozzle, which is described in the following.

The nozzle can include a housing and a pipe socket and be provided with cylindrical rollers, with horizontal axis of rotation and transversely positioned in relation to the moving direction of the machine and characterized thereby, it is provided with one or more cylindrical rollers, each of which is containing an axle with two or more free wheeling bearings fitted in a tube covered with outside linings, which can be of varied materials. The free wheeling bearings are so constructed, that the roller at movement along the floor in a certain direction, freely can rotate around its own axis, but the roller is blocked, when it is moved in the

opposite direction. When the roller is moved along the floor surface in blocked position, hair, fibers, etc. are assembled in the wedge-shaped area between the roller and the surface, in the shape of an oblong cushion, which it is easy to extract or pick up in a container, designed for the purpose. By using of cylindrical roller with a circular cross section, which are moved in reciprocating direction, the in the invention described qualities are obtained.

10 The in the invention used rollers can be covered with outside lining of various kinds, adapted to the actual cleaning task. For the cleaning of carpets and pre-mixed carpeting, rollers with a plane - or a nearly plane - gummy surface can be used, and thereby, both efficiently and gently, remove hair, thread and the like. If the vacuum cleaner used is of the type, after which water or detergent through a jet is sprayed on the carpet surface, the said rubber rollers are suitable to wipe the water against the extractor duct, for efficient extraction. Another roller can be covered with an external lining, designed as an cylindrical brush roller or be covered with bristle like materials, which partly is assisting to remove hair etc. and partly gives the carpet pile a slight brushing effect, which is improving the vacuum cleaning effect. The same brush roller can also be used for dry vacuum cleaning on solid flooring. Mainly at floor washing, the brush roller is working as a fixed brush in the blocked position - similar to a scrubbing-brush - while the rubber roller is working like a rubber scraper, when the nozzle is moved in the direction, where the roller is blocked. Other roller linings can also be considered, adapted for the job.

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The in the nozzle, in accordance with the invention, mounted rollers can be suspended in a combined suspension and activation unit, making it possible, easily to activate that or those rollers, the user wants to apply after demand. In the design of the nozzle, for instance where one brush roller and one rubber roller are used, the user can select to activate the brush roller alone, the rubber roller alone, both rollers at the same time or none of the rollers. The activation of the rollers, are guided by a hand or foot operated activation grip on the upper side of the nozzle. The suspension with rollers is pressed against the sur-

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face of possibly adjustable springs or by its own weight. The suspension and activation system used in the nozzle, can be extended by demand to include several adjustable functions, for instance when manufacturing nozzles for professional use. Likewise,  
5 a more simple design also can be considered.

The rollers used in the nozzle, according to the invention, are provided with beams, so designed and so suspended, that the surfaces of the rollers are being scraped by the beams, thereby hair  
10 and foreign materials, which are sticking to those, are scraped off and extracted, when the rollers rotate. Hereby, the rollers are self cleaning during use. The beam, which is cleaning the brush roller, can be likely designed as a comb, where the teeth are intruding between the bristles of the brush rollers. Hereby,  
15 hair, etc. are picked up by the brushes, when the roller is moved along the surface in the blocked position, and caught by the comb and extracted, when the roller is revolving. The beam, cleaning the plain rubber roller, can be designed as a straight, rectangular plate of suitable materials, for example steel or plast,  
20 possibly provided with a hard-wearing edge against the roller. The cleaning beam can be suspended in pivot pins, and can be pressed against the rollers, either by means of springs or by own weight.

25 The rectangular beam, which in accordance with the invention, is cleaning the plain rubber roller, prevents the air stream pass by the upper surface of the rubber roller, when the beam is designed air tight or nearly air tight. Hereby, the suction of the nozzle is concentrated to the space between the roller and the underlay.  
30 If the air stream is blocked to such a degree, that the vacuum power is reduced, the beam, which is preventing the air stream to pass the top of the roller, opens due to the difference in the pressure between the vacuum side and the pressure side. By adjusting the weight of the beam or the tension of the spring load,  
35 the time of opening and closing can be regulated after need. It is of greatest importance to establish the highest possible vacuum in the mentioned space area, especially when suck in water. When the rubber roller is out of function by lifted up from the floor surface, free suction below the roller is established.

According to the invention, the said nozzle can be designed in different ways some of which are described in the following, referring to the enclosed drawing, Figures 1, 2, 3, 4, and 5.

5 On the drawing, Fig.1 is shown a cross section of a cylindrical roller. The roller is carried of an axle 1, which can be fastened in the nozzle for a vacuum cleaner, a brushing machine or to a similar floor cleaning machine, and be of a suitable length in relation to the nozzle. On the axle 1 is fitted two or more free  
10 wheeling bearings 2 of a known construction, which allows rotation in one direction only, fitted in a tube 3, covered with suitable lining on the outer surface 4. When the roller is moved along the surface 5 in the direction indicated by the arrow a, the free wheeling bearings allow the roller to revolve, indicated by  
15 the arrow c, along the surface 5. When the roller is moved along the surface 5 in the opposite direction, as indicated by the arrow b, the free wheeling bearings 2 are blocking the revolving of the roller. By this the roller make a scraping movement along the surface 5. Due to the friction in the wedge-shaped space, appearing between the cylindrical surface, and the plane surface - or  
20 the nearly plane surface - hair, thread and foreign materials are withdrawn by the blocked roller, and curled up into an oblong, cylindrical cushion of hair and thread, easy to extract or to pick up. Due to the design of roller, the contact surface between  
25 the roller and the floor surface, is changing frequently during the use. Hereby the optimum wearing quality and performance is obtained.

The surface of the roller can be of different suitable materials,  
30 just as the structure of the surface can be of different nature. On Fig.2 is shown a roller designed as described under Fig.1, but with an outside lining of brushes 6. The stiffness and the shape of the bristles can be made in accordance with the cleaning task.

35 On Fig.3 is in cross section shown the construction of an activation handle device, which, in accordance with the invention, is activating the said suspension and activation device. The activation handle 7, has an approximate triangular cross section and is of a suitable length, and can turn around the axis 8. The lower  
40 edge of the handle 7 is cut across to allow a rolling move-

ment, shown by the arrow j, along the upper surface of the nozzle 11. As the axis 8 of the handle 7 is placed in the distance d in relation to the one contact surface of the handle, and in the distance e in relation to the other contact surface, and as those distances d and e are different, the elevating arm 9, carrying the roller suspension in the axle 10, is lifting or lowering the suspension a similar distance f, which is equal to the difference between the distances d and e, obtained when the activation handle 7 is turned.

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On Fig.5 is in cross section shown a practical construction as an example, using two of the in the invention said cylindrical rollers, as shown and described in Fig.1 and Fig.2. The one roller, Fig.2, is shown as a cylindrical brush roller, fastened at the axle 1 in the arms 16. The other roller, Fig.1, is shown with a cylindrical cover of gummy materials, fastened at the axle 1 in the other end of the arms 16. These are fastened by pivot pins 17 in the nozzle housing 14, which are adapted to the vacuum cleaner by the pipe socket 15. The arms 16 are turnable in an arc of circle round the pivot pins 17, so the rollers, Fig.1 and Fig.2, can be lifted or lowered as required, as indicated by the arrows h. The arms 16 are raised or lowered by the vertical bars 9, fastened in the lower end of the pivot pins 10 in the arms 16, and in the upper end at the pivot pins 8 in the activating handle 7. The rollers Fig.1 and Fig.2, are pressed down against the surface 5 by the springs 18. By adjusting the load of the springs 18, the pressure of the rollers, Fig.1 and Fig.2, against the surface 5, can be regulated. If the rubber roller, Fig.1 is to be uncoupled, it can be lifted by turning the foot or hand operated activation handle 7 in the direction, as indicated by the arrow j. When the hole nozzle 14 is moved forward, as indicated by the arrow a, the rollers Fig.1 and Fig.2 can revolve freely around their own axis, as indicated by the arrow g. When the nozzle 14 is moved backwards as indicated by the arrow b, the free wheeling bearings in the rollers, Fig.1 and Fig.2, are blocking the rollers. Hereby, the direction depending scraping effect is obtained, as intended by the invention.

Hair, thread and other foreign materials, are hereby withdrawn by the rollers and curled up to an oblong cushion in front of these,

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and can thereby be extracted through the pipe connection to the vacuum cleaner at the socket 15. When vacuum cleaning with water the nozzle can be equipped with an injection pipe 19. Water, which is sprayed on the floor surface, is drawn as explained above, against the duct shaped socket 15 and evacuated.

The brush roller, Fig.2, is provided with a beam, made as a plane comb-shaped plate 12, as shown in Fig.4, suspended in the point 21 so the teeth of the comb are intruding the bristles at the brush roller, Fig.2. When the nozzle 14 is moved in the direction as indicated by the arrow b, the brush roller, Fig.2, is withdrawing hair and foreign materials. When the nozzle 14 is moved in the opposite direction, as indicated by the arrow a, the brush roller Fig.2, is revolving. Hair and foreign materials, caught by the brushes, are scraped off and evacuated. Hair, thread and the like are thereby not winded around the roller.

The rubber roller, Fig.1 is provided with a beam, made as a rectangular plate 13, Fig.4, and suspended in the point 22 in such a way, that it fits tightly against the roller, Fig.1, by means of the spring 20 and is turnable, as indicated by the arrow i. When the nozzle 14 is moved in the direction indicated by the arrow a, the roller, Fig.1 is rotating, as indicated by the arrow g, whereby, hair and foreign materials including possible water, are scraped off the roller, Fig.1, by the beam 13, at which the roller becomes self cleaning.

The rectangular beam 13, Fig.4, can be so constructed, so it fully or partly, is preventing the air stream to pass the upper side of the roller, Fig.1. The necessary vacuum, sufficient to open the air passage along the upper side of the roller, Fig.1, by turning the beam 13 as indicated at the arrow i, can be regulated by means of the tension of the spring 20 or by the weight of the beam 13. When the roller, Fig.1, is lifted from the surface 5, there is unhindered passage of the vacuum stream below the roller by which the vacuum power is lead to the brush roller, Fig.2.

C L A I M S

1. Nozzle for use in connection with vacuum cleaners, carpet brushing machines or other machines, for cleaning floors, covered with different kind of materials, where the said nozzle comprise a housing (14) and a pipe socket (15 provided with a cylindrical roller of which the axis of rotation is horizontal and is transversely positioned in relation to the moving direction of the machine, characterized thereby, the nozzle is provided with one or more cylindrical rollers, and the roller/rollers comprising an axis (1) and two or more free wheeling bearings (2), fitted in a tube (3) covered with an outside lining (4), the said free wheeling bearings (2) are so constructed, that the roller, during the movement along the surface (5) in one direction, can freely revolve around its own axis, but that the revolving is blocked, when the roller is moved in the opposite direction.

2. Nozzle in accordance with claim 1, characterized thereby, one or more of the said rollers, used in the nozzle, are mounted in a set of horizontal positioned arms (16), turning around a set of pivot pins (17) fastened in the nozzle housing (14) and the pipe socket (15), is activated by a set of bars (9), fastened in the one end in the horizontal mounted arms (16) by the axle (10) and fastened in the other end in the activation handle (7) by the pivot pins (8), and where the suspension is pressed against the surface (5) by springs (18) or its own weight and where the turning axis (8) of the activation handle (7) is placed in the distances (d) and (e) from the two contact surfaces of the activation handle (7), and the said distances (d) and (e) mutually are of different size, whereby the bars (9) can be raised or lowered the distance (f).

3. Nozzle in accordance with claim 1 or 2, characterized thereby, one or more of the said rollers, used in the invention, have a plane - or a nearly plane - surface of gummy materials (4).

4. Nozzle in accordance with claim 1 or 2, c h a r a c t e r i -  
z e d thereby, one or more of the said rollers used in the nozz-  
le, have a surface of brushes or brush like materials (6).

5 5. Nozzle in accordance with claim 3, c h a r a c t e r i z e d  
thereby, the rollers used in the nozzle, are provided with rect-  
angular beams (13), suspended turnable in point (22) in the hou-  
sing (14) and with contact surface against the roller, and is  
pressed against this by pressure of the spring (20) or by the own  
10 weight of the beam (13).

6. Nozzle in accordance with claim 4, c h a r a c t e r i z e d  
thereby, the rollers used in the nozzle, are provided with comb  
shaped beams (12), suspended turnable in the point (21) in the  
15 housing (14) and with contact surface against the roller, and  
is pressed against this by pressure of the spring (23) or by the  
own weight of the beam (12).

7. Nozzle in accordance with claim 5, c h a r a c t e r i z e d  
20 thereby, the beam (13) is so carried out, that it fully or partly,  
is preventing the vacuum air stream passing the space between the  
under side of the housing (14) and the top side of the roller, in  
such a way, that the beam (13), which fits tightly against the  
surface of the roller, is allowed to open, when the vacuum power  
25 has reached such a size, exceeding the power of which, the spring  
(20) and the own weight of the beam (13), is holding the beam (13)  
pressed against the roller.

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Fig.1

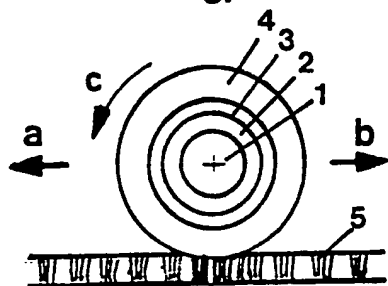


Fig.2

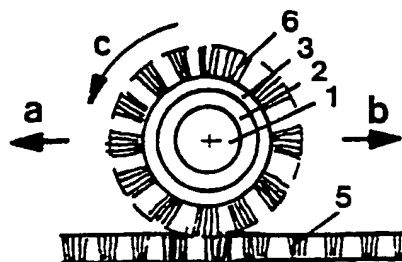


Fig.3

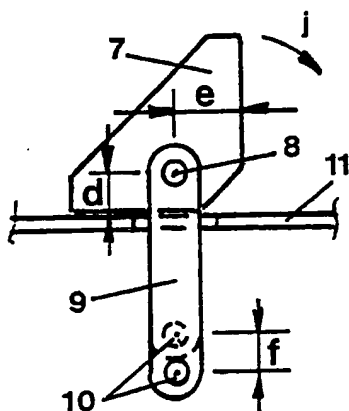


Fig.4

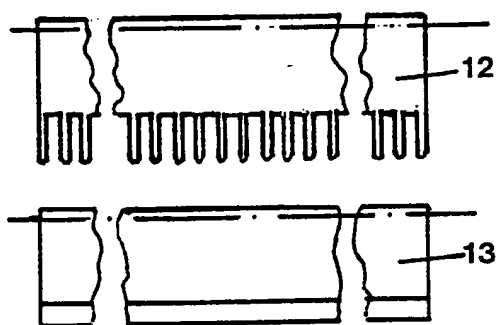
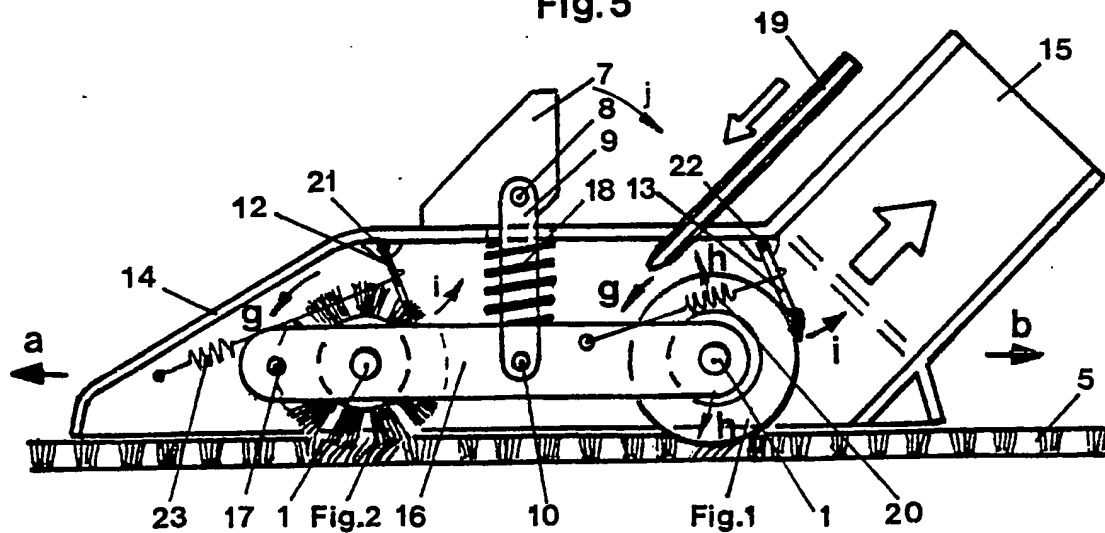
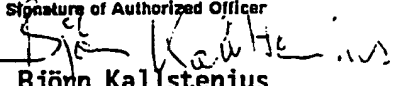


Fig.5



# INTERNATIONAL SEARCH REPORT

International Application No PCT/DK 91/00391

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>6</sup> According to International Patent Classification (IPC) or to both National Classification and IPC <b>IPC5: A 47 L 9/02</b>						
<b>II. FIELDS SEARCHED</b> <div style="text-align: center;">Minimum Documentation Searched<sup>7</sup></div> <table style="width: 100%; border: none;"> <tr> <td style="width: 25%; border: none;">Classification System</td> <td style="border: none;">Classification Symbols</td> </tr> <tr> <td style="border: none; height: 40px; vertical-align: bottom;">IPC5</td> <td style="border: none; vertical-align: bottom;">A 47 L</td> </tr> </table> <div style="text-align: center; padding-top: 10px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched<sup>8</sup></div>			Classification System	Classification Symbols	IPC5	A 47 L
Classification System	Classification Symbols					
IPC5	A 47 L					
<b>SE,DK,FI,NO classes as above</b>						
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b>						
Category *	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>				
A	DE, B2, 2530126 (JOST, THEODOR) 29 June 1978, see the whole document --	1-7				
A	DE, A1, 2835781 (SIEMENS AG) 28 February 1980, see the whole document --	1-7				
A	DE, A1, 3238814 (AKTIEBOLAGET ELECTROLUX) 11 May 1983, see the whole document --	1-7				
A	DE, A, 2045804 (BISSELL INC.) 22 April 1971, see the whole document --	1-7				
A	US, A, 2303089 (E.O. PETERSON) 24 November 1942, see the whole document --	1-7				
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p><sup>*</sup> Special categories of cited documents:<sup>10</sup></p> <p><sup>"A"</sup> document defining the general state of the art which is not considered to be of particular relevance</p> <p><sup>"E"</sup> earlier document but published on or after the international filing date</p> <p><sup>"L"</sup> document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p><sup>"O"</sup> document referring to an oral disclosure, use, exhibition or other means</p> <p><sup>"P"</sup> document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 48%;"> <p><sup>"T"</sup> later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p><sup>"X"</sup> document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p><sup>"Y"</sup> document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p><sup>"&amp;"</sup> document member of the same patent family</p> </div> </div>						
<b>IV. CERTIFICATION</b>						
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report				
23rd March 1992		1992 -03- 26				
International Searching Authority		Signature of Authorized Officer				
<b>SWEDISH PATENT OFFICE</b>		 <b>Björn Kallstenius</b>				

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	US, A, 1136136 (E.A. HUNT) 20 April 1915, see the whole document -----	1-7

**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.PCT/DK 91/00391**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.  
The members are as contained in the Swedish Patent Office EDP file on 28/02/92  
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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DE-A1- 2835781	80-02-28	NONE	
DE-A1- 3238814	83-05-11	FR-A-B- 2515501 GB-A-B- 2109224 NL-A- 8204269 SE-B-C- 442815 SE-A- 8106487	83-05-06 83-06-02 83-06-01 86-02-03 83-05-04
DE-A- 2045804	71-04-22	FR-A- 2064233	71-07-16
US-A- 2303089	42-11-24	NONE	
US-A- 1136136	15-04-20	NONE	